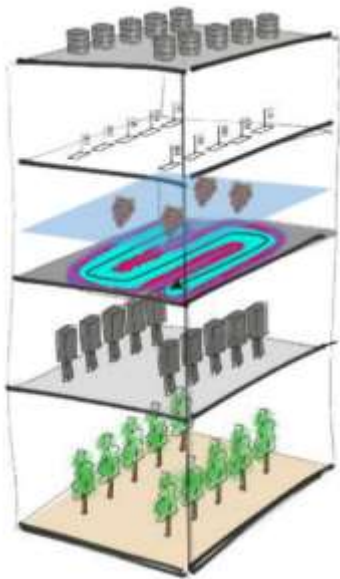


[UTOPIA] – a software framework for smart farming

UTOPIA is a user-friendly software framework for smart agriculture – a farming method that has the potential of increasing the yield per square meter by means of automated agricultural machinery, which provides crops with the precise treatment that they need. The aim of UTOPIA is to make smart agriculture more accessible, affordable and user-friendly.

A bottom-up approach to the development of the smart farming solution



*Concept of Stacked Layers (digital twin), combining navigational occupancy cost-maps with GIS.
Credit: UTOPIA*

The aim of UTOPIA is to create a solution that would cater to the needs of the food and agriculture industry. For that reason, for the first three months UTOPIA has been in contact with different stakeholders working in the agricultural sector – wholesale chain companies, manufacturers of the farming equipment, supermarkets and, of course, farmers. A key finding made by our use-case providers is that stakeholders would like to have a solution with a user-friendly interface that does not require extra training in smart device operation. Furthermore, farmers would like to have a hassle-free connection between different agricultural solutions that they use on a farm. This is at present hard to achieve because the technical standards and interfaces are rather diverse. The UTOPIA framework enables the connection and communication of completely different pieces of autonomous agricultural machinery – for example, a drone and a tractor. In this way it is possible to create a network of autonomous

agricultural equipment, which later can serve as the base for creating an accurate “digital twin” of the farm by exploiting the commonality of the information required by autonomous systems and agricultural data. This automated framework will help spend less time on monitoring and data processing, which will allow the farmers to react to changing conditions quickly and, as a result, increase the yields.

Based on stakeholders' consultations, the Data Distribution Service (DDS) is selected for the UTOPIA framework as the connectivity layer. DDS, being increasingly adopted in robotics with 'ROS2', will enable dependable, real-time, interoperable, scalable data exchanges using a publish and subscribe pattern. Furthermore, by combining layered navigational occupancy cost-maps, intelligent imaging for autonomous driving and GIS information together into a single digital twin, agricultural data can be given more context, with high granularity. This same digital twin is also used for planning (driving) paths through the field, and it is in turn augmented with new data from collaborative vehicles. If necessary, the collected data can also be shared with other stakeholders working in the food industry.

At present UTOPIA has two cases of application: grape cultivation (a use-case provided by Boğaziçi University) and seaweed farming (a use-case managed by Aqitec). Both seaweed farms and vineyards can be located in hard-to-reach areas, so the use of the UTOPIA platform there is quite promising. The digital twin of a vineyard or a seaweed farm allows the farmers to establish effective remote control over the cultivated area, thus reducing labor costs and minimizing time investments.



Photo left: Visit offshore seaweed cultivation test site by Aqitec Projects. Photo credit: Ivo Wieling Photo right: Field experiment with the connectivity layer. Photo credit: Intelligent Autonomous Mobility Center

Do you want to be informed when the framework will be available, or do you want early access to test? What do you expect from robotics and digital technologies in your work? Or do you simply want to share your thoughts? Drop us a line at info@utopia-project.eu.

Relevant link(s)



www.utopia-project.eu

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